

Mars Escape: Increasing Self-Efficacy and Self-Regulating Behaviors of Low-Income Youth Through Game-Play

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Abstract: The poverty cycle in the United States is continued by the lack of academic achievement of low-income students. This paper describes the design, development, implementation and evaluation of a game-based learning module aimed at increasing academic achievement among low-income youth. Research shows that self-efficacy, or one's belief in his or her ability to complete tasks and reach goals, and self-regulating behaviors, or the methods we employ to monitor our progress towards our goals, have a profound impact on academic achievement. The purpose of this project was to increase both self-efficacy and self-regulating behaviors through a fun and engaging environment. The target audience of the project was low-income 3rd-5th graders. The game was implemented in two afterschool programs that serve low-income youth in Baton Rouge, LA.

Introduction

Low-income and at-risk youth consistently exhibit poorer academic performance than their more affluent peers. This low achievement leads to lower college attendance, higher rates of unemployment, and higher dependence on government assistance programs. By addressing this discrepancy early in a child's educational journey, the poverty cycle can be disrupted. This project is a reflection of my life-long interest in the existing inequalities and in ways to lessen the achievement gap between low and higher-income youth. As a previous Resident Services Coordinator and afterschool program facilitator at several low-income housing developments ranging in location from upstate New York, Southern New Jersey, Northern California, and Hawaii I've seen the devastating academic effect that poverty has on youth. I've witnessed the decrease in academic interest and motivation starting around 3rd grade, bred from the pattern of academics being put on the backburner. There are, however, ways to combat this and provide these youth with the tools to make for themselves a brighter future.

Two of the factors that contribute to this poor academic achievement are low self-efficacy, and lack of self-regulating behaviors. Luckily, these two factors are malleable. The purpose of this Instructional Design Project was to develop and evaluate a game-based instructional module, entitled Mars Escape, that increased academic self-efficacy and self-regulating behaviors among low-income third, fourth, and fifth graders residing in low-income housing.

Literature Review

In the United States, almost half of low-income students do not graduate from high school, despite having similar aspirations to their higher-income peers (Daphna Oyserman, Johnson, & James, 2011). Lack of academic achievement among low-income students has a number of sources, including low self-efficacy and lack of self-regulating behaviors (Daphna Oyserman, Bybee, Terry, & Hart-Johnson, 2004). Self-efficacy can be broadly defined as self-confidence, or one's belief in their ability to do well and reach goals (Komarraju & Nadler, 2013). Academic self-efficacy is therefore the belief in one's academic abilities, and has proven an accurate indicator of academic achievement (Margolis & McCabe, 2004; Zuffianò et al., 2013). Similar to self-efficacy, self-regulating behaviors are also extremely important in academic outcomes. Self-regulating behaviors are the steps that one takes to reach his/her goals. Low-income youth and their higher income peers have similar aspirations, but low-income youth tend to have poor self-regulation. Self-regulating behaviors help youth see and plan the path to their desired future self (Destin & Oyserman, 2010). Youth who exhibit higher levels of self-regulation are much more likely to spend more time on homework, and participate in class (Daphna Oyserman et al., 2004). In 2006, Oyserman, Bybee, and Terry conducted an intervention based on increasing self-regulating behaviors among low-income 8th graders. The study found that academic goals are more likely to be achieved when they are plausible and include specific actions or plans to reach them, or self-regulating behaviors (Daphna Oyserman, Bybee, & Terry, 2006).

Self-efficacy is made up of four realms: Mastery, Modeling, Verbal Persuasion, and Emotional Arousal. Mastery is the most powerful realm, and relates to past experiences. Modeling relates to seeing others succeed by overcoming relatable challenges. Verbal Persuasion is perhaps the weakest, and relates to encouragement from others. Finally, Emotional Arousal is the body's response to fear and/or anxiety in a given situation, which cues expectations of failure or success (A Bandura, 1977). Low-income youth struggle in these areas for a variety of reasons including lack of past academic success, lack of relatable education-dependent role models, stressful home situations, lack of parental involvement, and struggling school systems. This lack of self-efficacy makes future academic successes seem non-congruent to the vision of one's self, and goals that don't feel congruent to one's self seem pointless and hopeless (Oyserman & Destin, 2010). This Is Me: Mars Escape was developed to support higher self-efficacy by providing players plentiful chances for mastery, lots of persuasion, and relatable characters to model successful

behaviors.

Similar to games that offer no educational outcome, educational games must be fun if players are going to play them (Lieberman, 2001). Games that lack the fun-element won't be successful, educational or not. To make educational games fun, one can consider Gee's three categories of good educational games: empowered learners, problem solving, and understanding (Gee, 2005), and also Rouse's elements of good gaming (Rouse, 2005). Under Gee's category of empowered learning is co-design, or giving the player power to have input into the game (Gee, 2005). Mars Escape encourages the user to input their specific goals and strategies to reach those goals, in the hopes of giving the learner a sense of co-design and also creating an emotional experience, one of Rouse's elements. Several elements of good games, including a sense of accomplishment, solvable puzzles, and bragging rights, are congruent to ways to increase mastery, the most important layer of self-efficacy (A Bandura, 1977; Rouse, 2005). While the majority of educational games are used to teach concrete skills, such as Ying & Yang's game to teach undergrads how to get their ERP certification (Ying & Yang, 2013). Games have also been successfully used to create attitudinal changes in players in several studies including Rage Control (Kahn, Ducharme, Travers, & Gonzalez-Heydrich, 2009), a study in which youth increased their understanding and control over emotional responses; and a study in which a video game increased self-esteem in players by combining self-relevant words with smiling faces (Baccus, Baldwin, & Packer, 2004).

Games that aim to create an attitudinal change in players must feel somehow congruent to the players. Attitudes are personal, and so to change attitudes, the players must feel like the game is speaking directly to them. Creating relatable characters that model behavior and attitudes is one way to do this (Lieberman, 2001). Mars Escape allows players to pick and name their character in hopes of creating relatability. Players will control their characters as their character racks up more and more successes and is praised for those successes. Accumulating a repertoire of successful experiences is an important factor in increasing self-esteem, which assists in increasing self-efficacy (Hosogi, Okada, Fujii, Noguchi, & Watanabe, 2012).

Design

Mars Escape was created from scratch using GameSalad, a visual development tool for non-programmers. Because it is meant to create an affective change, the goals were less concrete than a module aimed at teaching a specific skill or lesson. The two main goals were to create an increase in the player's reported self-efficacy, and to increase the player's understanding of the importance of self-regulating behaviors.

The game put players into the role of a kid living on a space station on Mars. Earth had long since become too polluted to be habitable, forcing the human population to

relocate to Mars. However, a massive meteorite heading directly towards the planet is threatening life on Mars. The player is told that the adults are too afraid to be of any use, and so it is up to the player to save the population. Luckily, the character comes armed with an idea: Move the population to Saturn. In order to successfully complete this seemingly daunting task, the player is given a hierarchy of skills (Figure 1) presented as different pages in a notebook (Figure 2). The player is told that the goal of escaping Mars is called their Main Goal, this goal is broken into three smaller goals called Subgoals. Then each Subgoal is broken into three even smaller goals called strategies. In order to reach the main goal, they must master one Subgoal in each level by following the strategies. The culminating challenge is to use all the skills to actually escape Mars and save the day.

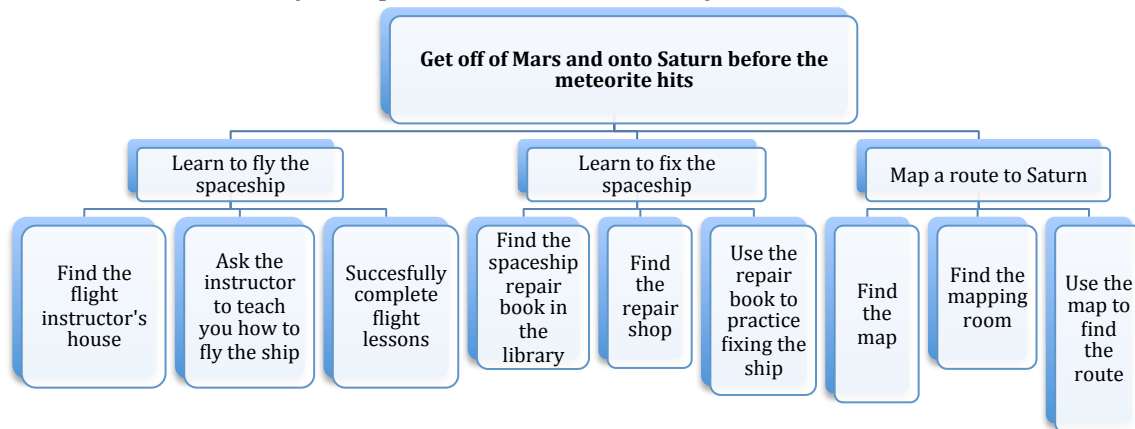


Figure 1. The skills the player must master.

The game was divided into four levels including three main levels and one culminating level. A pre- and post-test were also administered. The hierarchical design of the game was meant to 1. provide opportunities for mastery of each skill, a critical aspect of self-efficacy, and 2. break down the overwhelming task into manageable chunks to model the desired self-regulating behaviors.

As mentioned before, the overall goals were to increase self-efficacy and self-regulating behaviors. These two goals were broken into four main learning objectives:

1. Players report higher levels of confidence in their abilities to complete tasks and reach goals
2. Players recognize appropriate steps needed to reach goals
3. Players agree that thinking about ways to reach goals is important
4. Players report appropriate steps needed to reach their goals
 - a. Players identify an appropriate goal
 - b. Players give 1 appropriate method to reach goal (coded as sub-goal)

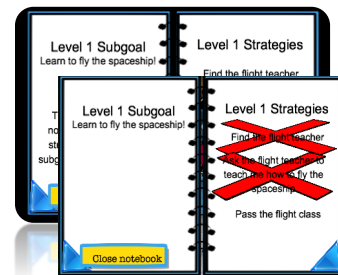


Figure 2. Presentation of the hierarchy of skills used a notebook tool.

- c. Players give 1 appropriate method to reach sub-goal (coded as strategy)

Methods

Before beginning to design or develop the project, I looked at the characteristics of my target audience. The target audience for the project was 3rd-5th graders residing in low-income housing. Through my own experience working with this population as well as some generalizations applicable to the age group, I defined the target player's cognitive, physiological, affective and social characteristics (Table 1). I used these characteristics to design the project to be applicable to them.

Cognitive	Physiological
<ul style="list-style-type: none"> • 3rd-5th grade • Experienced with technology, especially basic computer games • Poor to average academics • Below average reading level 	<ul style="list-style-type: none"> • 8-11 years old • Home problems related to instability, parental incarceration, hunger, neglect • Short attention spans • Feelings of isolation and segregation
Affective	Social
<ul style="list-style-type: none"> • High aspirations of college and career • Enjoy games, including computer games • Poor self-regulating behaviors • Low self-efficacy 	<ul style="list-style-type: none"> • Low-income and reside in low-income communities • Friends are important, but family is more important • Often get in trouble at school due to fighting and other problem behavior

Table 1. Learner characteristics.

Why Mars? There are several reasons for the game taking place on Mars, including that I wanted to recognize that the target player's tendency to feel segregated or isolated. This was furthered by the use of a chain-link fence as the background of the



Figure 3. A chain-link fence background serves to mimic the feeling of being trapped and isolated.



Figure 3. A variety of game types were used throughout the game to keep the attention of the player.

space station (Figure 3). I also wanted to grab the attention of the player to address the target player's short attention span. Earth is boring. Mars is different and exciting. Another tactic for maintaining the player's attention was the use of several different types of gameplay (Figure 4).

The target player had high aspirations but poor self-regulating behaviors, so to target this, I challenged the player to think about how to reach the lofty goal of escaping to Saturn, or "how do I get from where I am now to where I want to be?"

Self-Efficacy

The game was modeled to increase self-efficacy by giving opportunities for mastery of skills, modeling desired behaviors, and through persuasion, or positive feedback and encouragement.



Figure 4. Players picked and named their own character from a wide range.

Mastery. To set the stage for mastery, it was important to allow the player to choose his or her own character and name him or her whatever they wanted (Figure 5). This helped the player feel that the character was an extension of him/herself, and therefore the success of the character was their success.

Once that connection was established, allowing the player to keep track of their progress and see their achievements in real time targeted mastery. Also, all of the skills that the player learned throughout the game (such as flying the spaceship, mapping a route to Saturn, and fixing the spaceship) were put to the test in the final level. In the final level the player first had to collect all the adults, and then use their newfound skills to save the human population. The final level sealed the player's feeling of success and satisfaction (Figure 6).

Persuasion. Persuasion was targeted through positive reinforcement. Using words like "awesome!" reinforced that the player was doing well as they worked to reach their goal.

Modeling. The game included a variety of characters that demonstrated the desired behavior of planning out their goals. By seeing characters that the player

perceived to be “like me”, they were encouraged to believe that they too could do it (Figure 7).

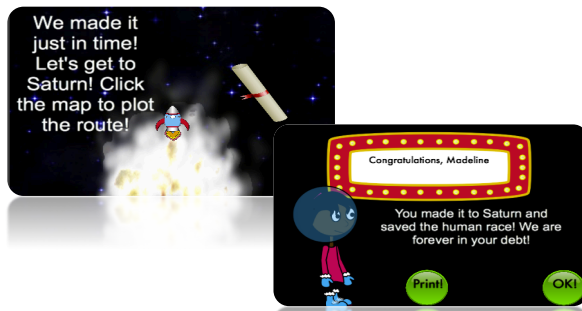


Figure 6. The player's mastery of the skills and resulting success are celebrated.



Figure 7. The game utilized role models that could be easily related to.

Self-Regulating Behaviors

Self-regulating behaviors were targeted through the use of a tool called the Drafting Station. This is a simple tool that I made up for the purpose of this project. Its purpose was to provide youth a very simple manner with which to think about how they could reach their goals. Players were provided with two drafting stations: One for the game and one for their personal use (Figure 8). The game drafting station detailed the process the player must follow to escape Mars. It put the main goal of

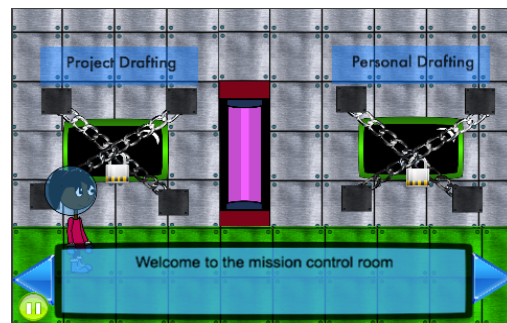


Figure 5. The player was presented with two drafting stations.

Getting off Mars and onto Saturn at the top and then broke that goal into smaller chunks that the player must achieve. Those smaller chunks became the levels, and the challenges within the levels. (See Figure 9.) These sub-goals and strategies were also accessible through the notebook tool (Figure 2).

The personal drafting station paralleled the game drafting station and had the player chose a real life goal and identify the sub goals and strategies to reach that goal (Figure 10). At the end of the game, the player had the option to print out their personal drafting station and also to create a new one from scratch.

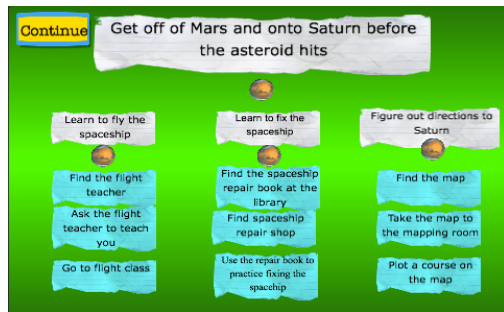


Figure 9. The project drafting station detailed the steps the player must follow to win the game.

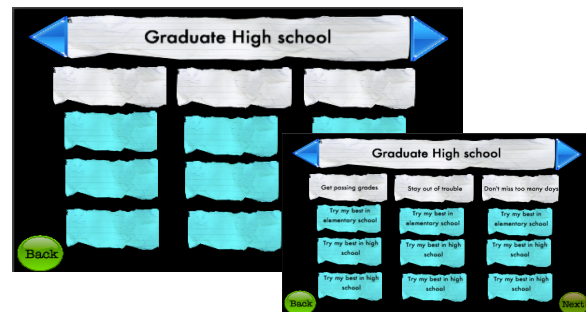


Figure 10. The player started with a blank personal drafting station. By the end of the game they had completely filled it out and had the option to print it.

Implementation

The game was offered as an optional activity during two afterschool programs run by the NHP Foundation (NHPF) in Baton Rouge, Louisiana. Youth were given the choice between playing the game, or participating in regularly scheduled program activities. Written parental consent and oral youth consent were required for youth who wished to participate. Initially, 18 youth participated in the pre-test; however only 10 participated in the post-test. Of those 10, only eight answered most of the questions. The other two only answered two questions each, so their results were excluded.

The small sample size of participants who completed the entire module and post test fell from the initial 18 for two main reasons. The first involved the available technology at one of the afterschool program sites: the computers were unable to smoothly handle the game resulting in extremely slow game play and frustrated players, many of whom opted out of finishing the game. The second reason was that the game took longer than anticipated for the players to complete. Several players were unable to complete the game in the time allotted, and due to the lack of a save function decided not to completely restart the game the next day.

Evaluation

The game went through formative evaluations at every stage of its development, resulting in many different versions before reaching its final form. It started out as a game set in the real world, in which players made choices that directly affected their future. However, after receiving peer and instructor feedback and reviewing Gee and Rouse's elements of good games, and Bandura's theory of self-efficacy, it became clear that the project would not be successful. The game was reworked to take place in a fantasy world, and focus more on self-regulating behaviors as a method for winning the game, as opposed to the original game that focused on making good choices. The hope of this approach was to arm the players with tools that they could apply to their own unique lives and situations.

The summative evaluation consisted of analyzing the data collected from the pre and post-test, which is discussed below.

Data Collection

Data was collected through pre and post surveys that assessed the player's level of self-efficacy and their appreciation and use of self-regulating behaviors. Each survey consisted of 9 self-regulation questions and 11 self-efficacy questions. The pre-survey asked an additional 5 questions that collected demographics.

The first portion of the assessment measured the player's understanding of self-regulation by asking them to answer fill in the blank and short answer questions about their goals and how they planned to reach them. The second portion of the assessment measured the player's self-efficacy and was created using Albert Bandura's Guide for Constructing Self-Efficacy Scales (2006). Players used a 5-point Likert scale to rate their ability to complete tasks and reach goals.

It was important to integrate the assessments within the game so as to maintain the player's attention and investment throughout the process. The player watched the

7 → Finish this sentence: When I grow up, my goal is to be ____
A zoo keeper

12 → Finish this sentence: To reach my goal of being A zoo keeper, I should ____
learn about animals

13 → To make sure I learn about animals, I should ____

Figure 6. The player's answers to certain questions were input into other questions to create a personalized feel for the pre and post tests.

opening animation before accessing the pre-test. Both pre and post surveys were presented in a colorful and user-friendly manner that inserted the player's answers to certain questions into the body of other questions to create a personal feeling (Figure 11).

Results and Analysis

Demographics. Eight youth completed both the pre and post surveys. Those 8 were predominately African American girls between the ages of 7 and 13 with 8, 10, and 11 being the most common ages. Six players reported that they usually received As and Bs, and two players reported that they usually received Bs and Cs. Participants reported a fairly even distribution of how much they liked school. All players resided in low-income housing located in Louisiana and attended a free onsite afterschool program dedicated to youth development.

Self-Efficacy. Players showed an increase in their overall self-reported self-efficacy. Data was analyzed in two separate ways in order to give the most accurate and least biased report.

The first method took the players' reported ability to complete a given task or goal

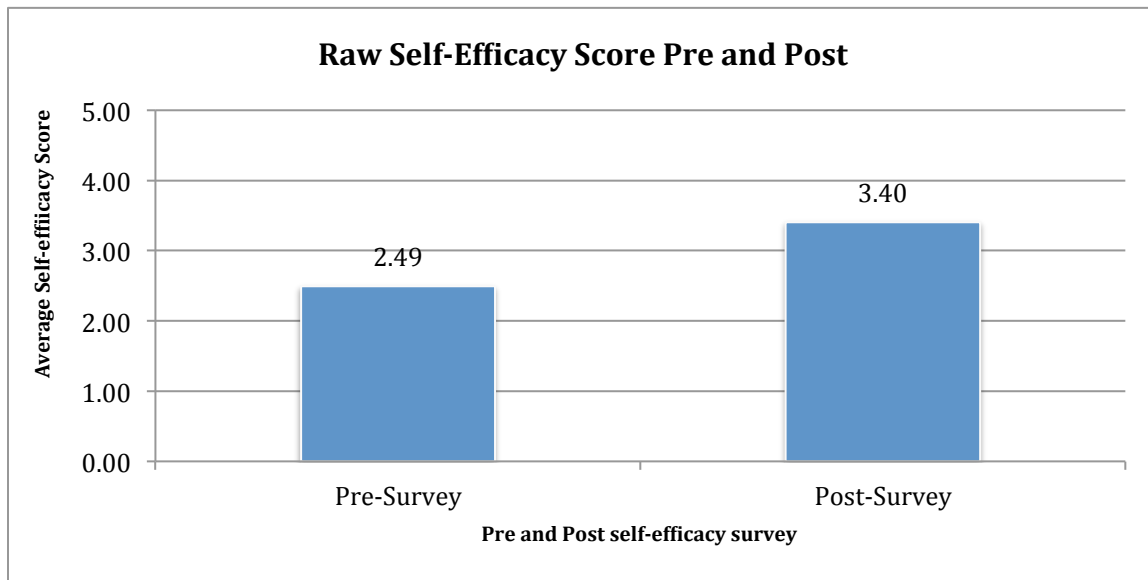


Figure 12. Self-Efficacy was assessed in two ways. The first took the answers to all 11 self-efficacy questions and divided them by 11 to give an average score.

from a 5-point Likert scale, ranging from 0, or "I know I can't do it" to 5, or "I know I can do it". The average score was calculated based on answers to all 11 self-efficacy questions. Using this method, players showed an average self-efficacy score of 2.49 on the pre-test and 3.4 on the post-test. This is an increase of almost an entire point (Figure 12).

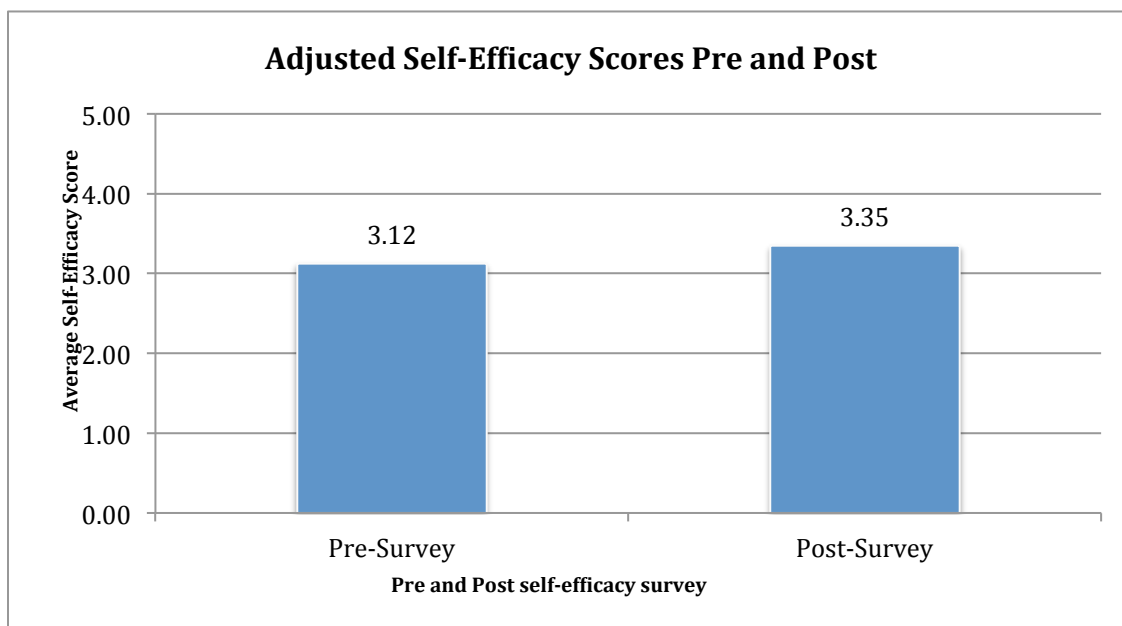


Figure 13. The second way that self-efficacy was assessed was by only measuring questions that had been answered on the pre and post tests.

However, several players left some questions blank on the pre-test. The first method counted these blanks as zeros, but the second method directly addresses this by throwing out the post-survey questions that corresponded with the blank pre-survey questions to find the average of only those answered on both the pre and post surveys. This resulted in a pre-test average self-efficacy score of 3.12, and an average post-test score of 3.35, or an increase of less than half a point (Figure 13).

Analysis. Every participant showed an increase in reported self-efficacy except for the youngest participant, a 7 year old, whose score remained the same. When looking more closely at the data collected from the 7 year old, I noticed that she answered “4” (the highest rating) for every self-efficacy question on both the pre and post survey. I suspect that the 11 questions may have been too much for her to read leading her to just pick 4 for every question. Luckily, because her score stayed the same, her self-efficacy data had neither a positive nor negative effect on the overall data. It did however lead me to ponder other ways of assessing self-efficacy in very young children in the future.

The overall positive self-efficacy results suggest that the game effectively increased self-efficacy in players. However, it is important to note that no follow up survey was given, so it is unknown if the results were lasting or only immediate.

Self-Regulation. Self-regulating behaviors were measured through 9 questions that asked the player to name goals and ways to reach those goals. Players were also asked their thoughts on the importance of thinking about ways to reach goals. Answers were coded as one or zero, one being an appropriate response, and zero being either no response or an inappropriate response. Example:

Question: To reach my goal of being a zookeeper¹, I should _____

Example appropriate response (1 point): learn about animals.

Example inappropriate response (0 points): do nothing.

This section of the assessment measured Objectives 2-4:

2. Players recognize appropriate steps needed to reach goals
3. Players agree that thinking about ways to reach goals is important
4. Players report appropriate steps needed to reach their goals
 - 4a. Players identify an appropriate goal
 - 4b. Players give 1 appropriate method to reach goal (coded as sub-goal)
 - 4c. Players give 1 appropriate method to reach sub-goal (coded as strategy)

¹ Zookeeper is an example. The actual goal would reflect what the player had entered in an earlier question.

I was less concerned with the player's actual answers than with evidence of thought put into their answers. In other words, I was not measuring if they gave necessarily "good" or "bad" Goals, Subgoals, and Strategies but rather if they showed a change in

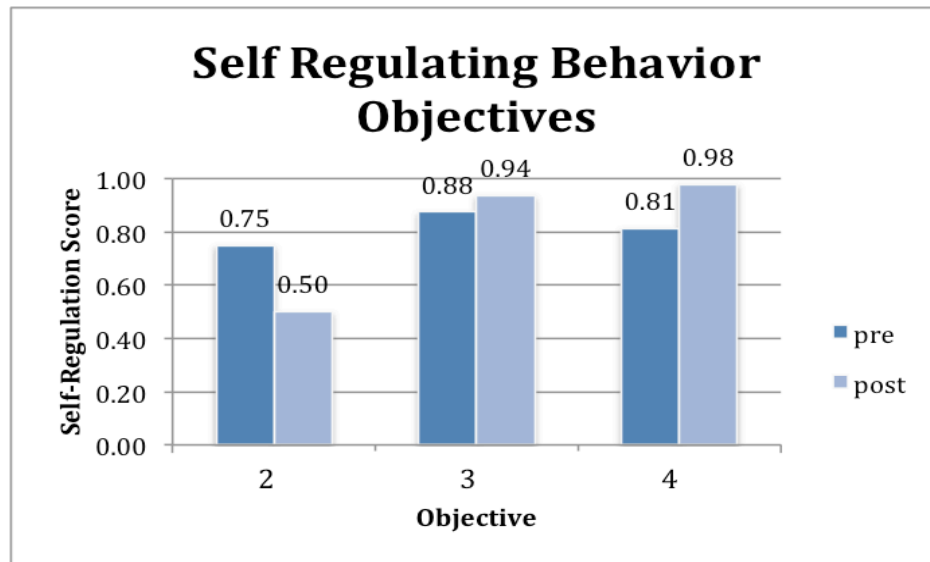


Figure 14. Self-regulating behavior objectives #2,3, and 4.

their thought process. This change would represent internalization of the lessons in the game.

Figure 14 shows that Objectives 3 and 4 showed a slight increase, while Objective 2 showed a .25pt decrease. The question for Objective 2 asked the player to identify whether a behavior was an example of a good or bad method of reaching a given goal. I was surprised at the decrease in correct responses from the pre- to post-test because this is a question that I considered to be very easy. It is possible that the question was too easy causing players to simply skim over it as opposed to actually reading it. It is also possible that players found the wording confusing.

Players showed an attitudinal change in Objective 3 (Figure 14). The average player demonstrated an increase in their understanding of the importance of thinking about ways to reach goals. Players showed a more tangible change in Objective 4, where they reported appropriate steps needed to reach their goals. Objective 4 was broken down into 3 goals, which are measured independently in Figure 15.

Figure 15 shows that players increased their understanding of appropriate steps needed to reach their goals by not only naming an appropriate goal but also by listing appropriate Sub-Goals and Strategies to reach that goal.

Analysis. While the majority of the self-regulating objectives showed an increase there were notably very high pre-test scores. Looking back at the pre-test questions, I suspect that the questions were too guiding, or prompted the player to answer correctly.

I was pleasantly surprised that the greatest increase in self-regulating objectives occurred on the objective that I assumed would be the most difficult (Figure 15). Objective 4 required the players to list appropriate steps to reach their goals. Players showed an average increase of .17pt from the pre to post. Objective 4b and 4c increased to 100% success, which suggests that participants showed the desired behavior of thinking about the questions more than they did in the pre-test.

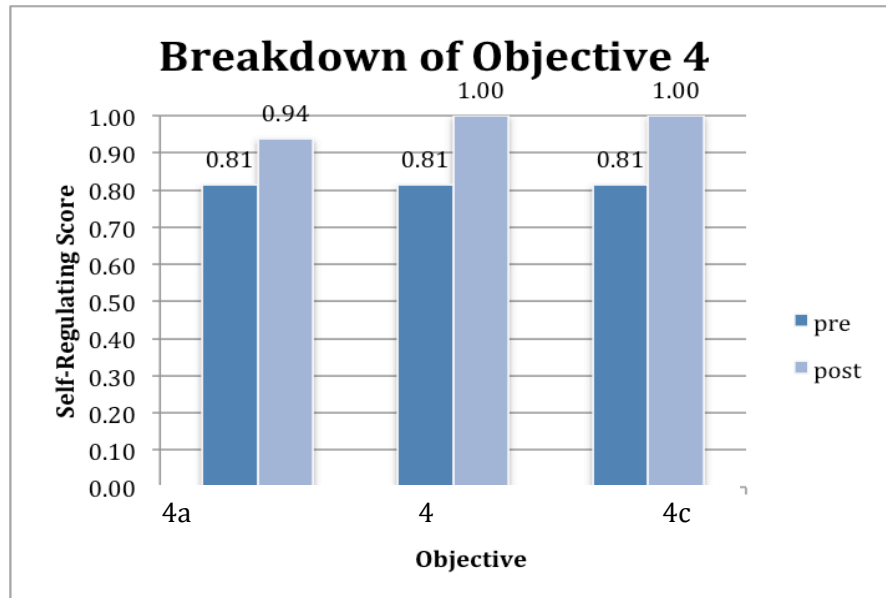


Figure 15. Objective 4 was broken down into 3 parts: 4a. Players identify an appropriate goal; 4b. Players give 1 appropriate method to reach goal (coded as sub-goal); 4c. Players give 1 appropriate method to reach sub-goal (coded as strategy)

Discussion

Overall, the results were positive although not as positive as I had hoped for. The increase in positive responses for objectives 1, 3, and 4 show that the game was effective in increasing self-efficacy and self-regulating behaviors. The negative outcome for objective 2 suggests that either the game needs to be altered to provide more instruction on recognizing appropriate steps to reach goals, or the assessment needs to be altered to make the question clearer.

Players were also administered a very brief attitudinal survey at the end of the game to assess how much they enjoyed the game. I administered this survey to help myself create more engaging learning environments in the future, but it also gave me insights into the current game's results. The attitudinal survey consisted of three questions, two of which asked the player to rate the game on how much they enjoyed it, and one that asked the player to assess the difficulty of the game.

The players were asked how much they enjoyed the game on a scale of 0-10. Two players reported loving it (10), and 1 reported hating it (0). The rest of the responses fell in the middle of the spectrum, and the average response was 6.57. Players were also asked to rate the game as "fun", "boring" or "so-so". The most common response was "fun", with two "boring"s and 1 "so-so". Finally, the players were asked if the game was "too hard", "too easy", or "just right". The majority of the responses said the game was "too easy". Two respondents said it was "too hard", and only one said it was "just right". The attitudinal data, although limited, suggests that players enjoyed the game for the most part, but that there is also plenty of room for improvement. In order for game-based learning to be effective, players must want to play the game. Creating games that are both fun and educational is a difficult undertaking; by improving the "fun-ness" of the game, the positive effect of the game can also be increased.

Limitations

It's important to note that there were several important limitations to the study. The lack of completion resulted in a small sample size. This could be addressed in the future in several ways: Add a save option to allow players to return to the game later, make the game a bit shorter, and compress the game file size to allow it to run better on older computers.

Looking at the pre and post-test questions, I think it would have been more telling and beneficial to ask the player more about their thoughts on self-regulating behaviors in addition to their goals and how they planned to reach them. The existing self-regulating questions were too leading, resulting in inflated pre-test results. The existing questions should be changed to provide less guidance and elicit more natural responses. In the future, it may be beneficial to have players complete a retrospective pre and post-test to assess how they feel they have grown as a result of participating.

Conclusion

While the results were not as high as I had hoped for, they were high enough to reinforce to the power of game-based learning to change affective behaviors. As an individual who is extremely interested in addressing the ever-present lack of academic success among low-income youth, this was an important project for me. I plan to take the lessons I learned from this project, as well as parts of the actual project, and apply them to the non-profit that I'm currently developing that is dedicated to lessening the achievement gap through game-based learning of financial literacy, affective behavioral change, and math and English skills.

References

- Baccus, J. R., Baldwin, M. W., & Packer, D. J. (2004). Increasing implicit self-esteem through classical conditioning. *Psychological Science*, 15(7), 498–502. <http://doi.org/10.1111/j.0956-7976.2004.00708.x>
- Bandura, A. (1977). Self-efficacy; Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191–215.
- Destin, M., & Oyserman, D. (2010). Incentivizing education: Seeing schoolwork as an investment, not a chore. *Journal of Experimental Social Psychology*, 46(5), 846–849. <http://doi.org/10.1016/j.jesp.2010.04.004>
- Gee, J. P. (2005). Learning by Design: good video games as learning machines. *Digital Media: Transformations in Human Communication*, 2(1), 173.
- Hosogi, M., Okada, A., Fujii, C., Noguchi, K., & Watanabe, K. (2012). Importance and usefulness of evaluating self-esteem in children. *BioPsychoSocial Medicine*, 6(9), 1–6.
- Kahn, J., Ducharme, P., Travers, B., & Gonzalez-Heydrich, J. (2009). RAGE Control: Regulate and Gain Emotional Control. *Studies in Health Technology and Informatics*, 149, 335–343.
- Komarraju, M., & Nadler, D. (2013). Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter? *Learning and Individual Differences*, 25, 67–72. <http://doi.org/10.1016/j.lindif.2013.01.005>
- Lieberman, D. (2001). Management of Chronic Pediatric Diseases with Interactive Health Games: Theory and Research Findings.
- Margolis, H., & McCabe, P. (2004). Self-efficacy: A key to improving the motivation of struggling learners. *The Clearing House*, 77(6), 241–249. <http://doi.org/10.3200/TCHS.77.6.241-249>
- Oyserman, D., Bybee, D., & Terry, K. (2006). Possible selves and academic outcomes: How and when possible selves impel action. *Journal of Personality and Social Psychology*, 91(1), 188–204. <http://doi.org/10.1037/0022-3514.91.1.188>
- Oyserman, D., Bybee, D., Terry, K., & Hart-Johnson, T. (2004). Possible selves as roadmaps. *Journal of Research in Personality*, 38(2), 130–149. [http://doi.org/10.1016/S0092-6566\(03\)00057-6](http://doi.org/10.1016/S0092-6566(03)00057-6)
- Oyserman, D., & Destin, M. (2010). Identity-based motivation: implications for intervention. *The Counseling Psychologist*. <http://doi.org/10.1177/0011000010374775>

- Oyserman, D., Johnson, E., & James, L. (2011). Seeing the Destination but Not the Path: Effects of Socioeconomic Disadvantage on School-focused Possible Self Content and Linked Behavioral Strategies. *Self and Identity*, 10(4), 474–492. <http://doi.org/10.1080/15298868.2010.487651>
- Rouse, R. (2005). *Game design: theory & practice* (2nd ed). Plano, Tex: Wordware Pub.
- Ying, M.-H., & Yang, K.-T. (2013). A Game-based Learning System using the ARCS Model and Fuzzy Logic. *Journal of Software*, 8(9). <http://doi.org/10.4304/jsw.8.9.2155-2162>
- Zuffianò, A., Alessandri, G., Gerbino, M., Luengo Kanacri, B. P., Di Giunta, L., Milioni, M., & Caprara, G. V. (2013). Academic achievement: The unique contribution of self-efficacy beliefs in self-regulated learning beyond intelligence, personality traits, and self-esteem. *Learning and Individual Differences*, 23, 158–162. <http://doi.org/10.1016/j.lindif.2012.07.010>